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(54) Pad, cushion or mattress

(57) A pad, cushion or mattress comprises a base and a top layer (2,1) of resilient material, having between them one or more liquid or gel containing envelopes (3). The material of the base layer (2) has a higher density than that of the top layer (1). The top layer (1) may be provided with transverse channels (5) which open to the external surface of the layer.

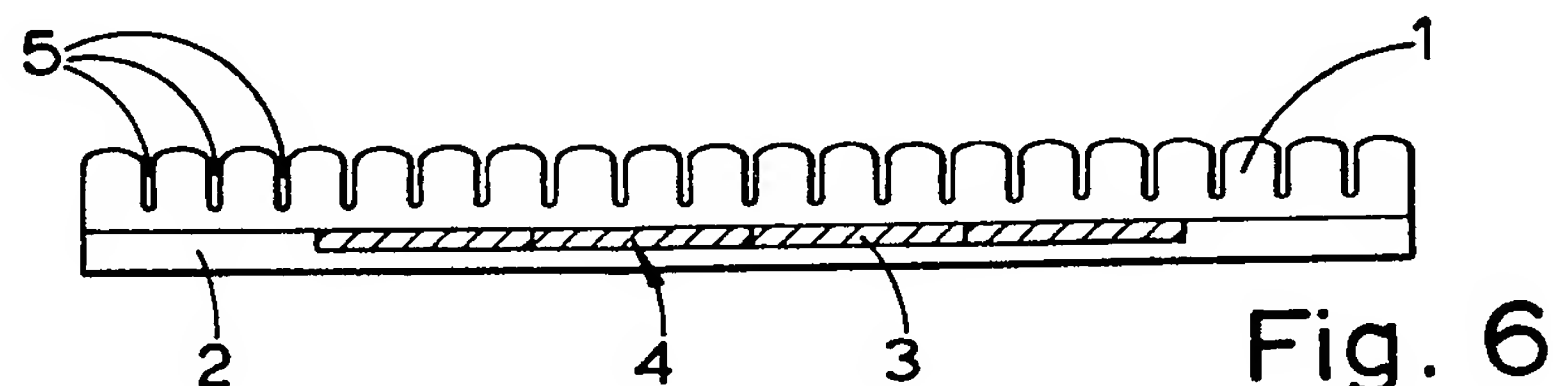
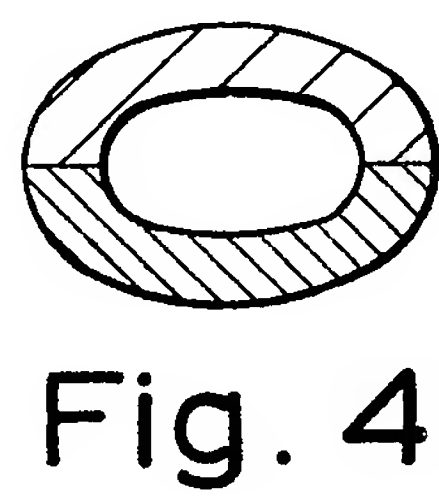
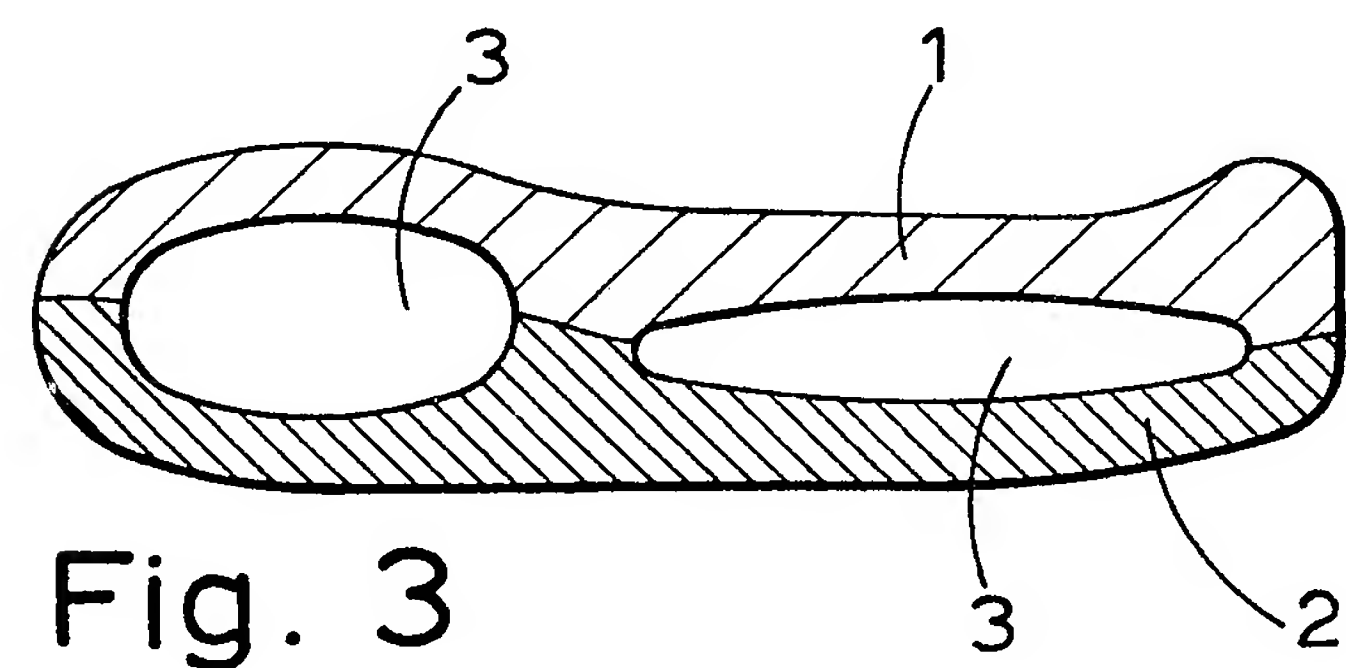
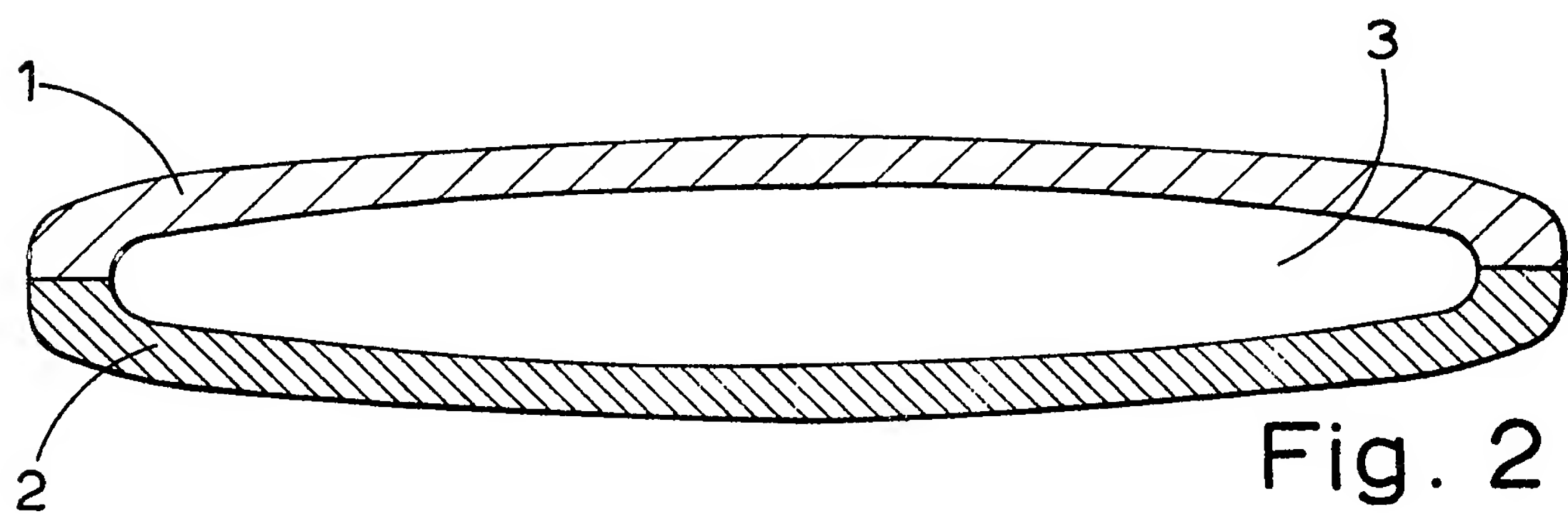
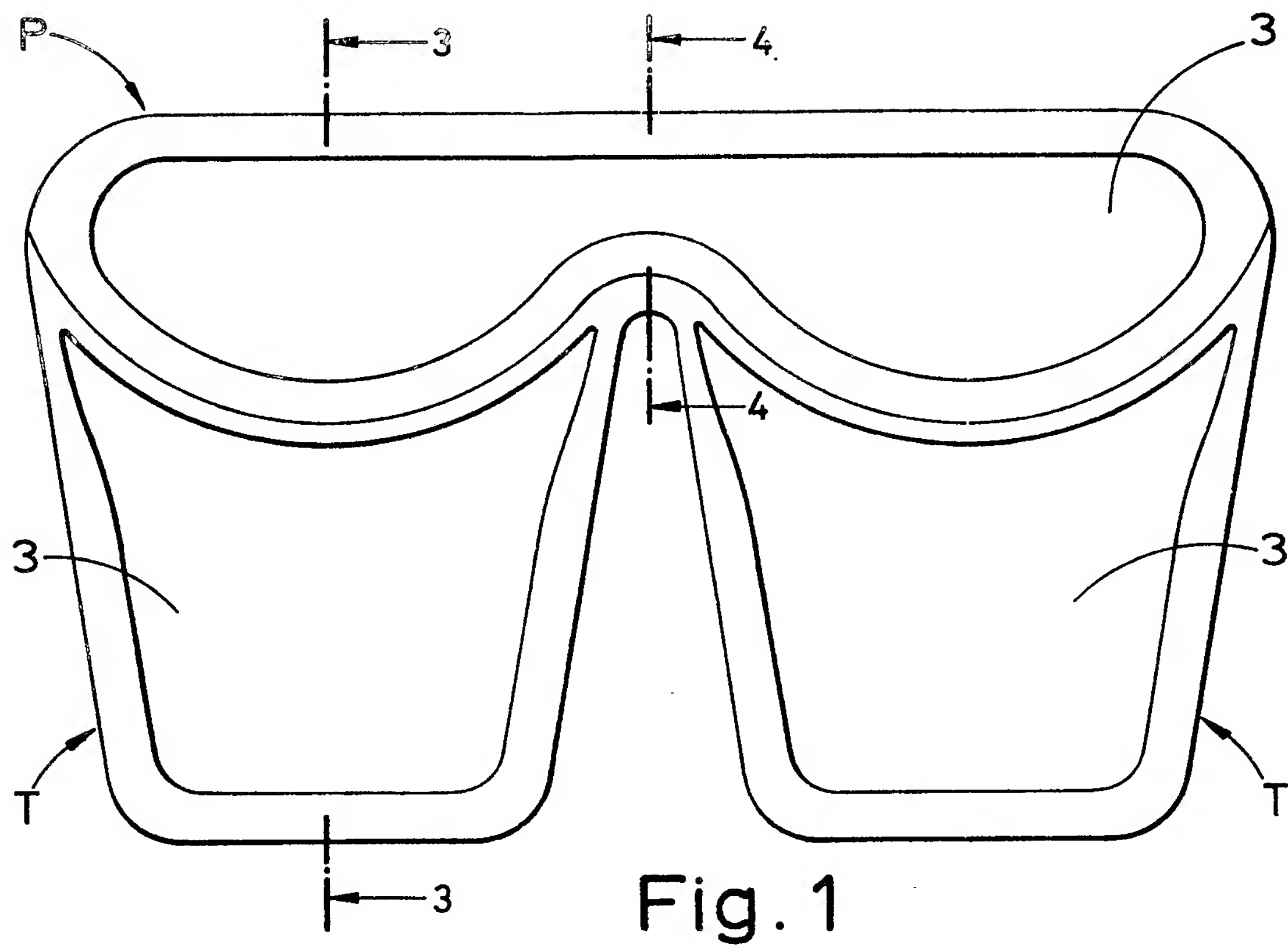


Fig. 6



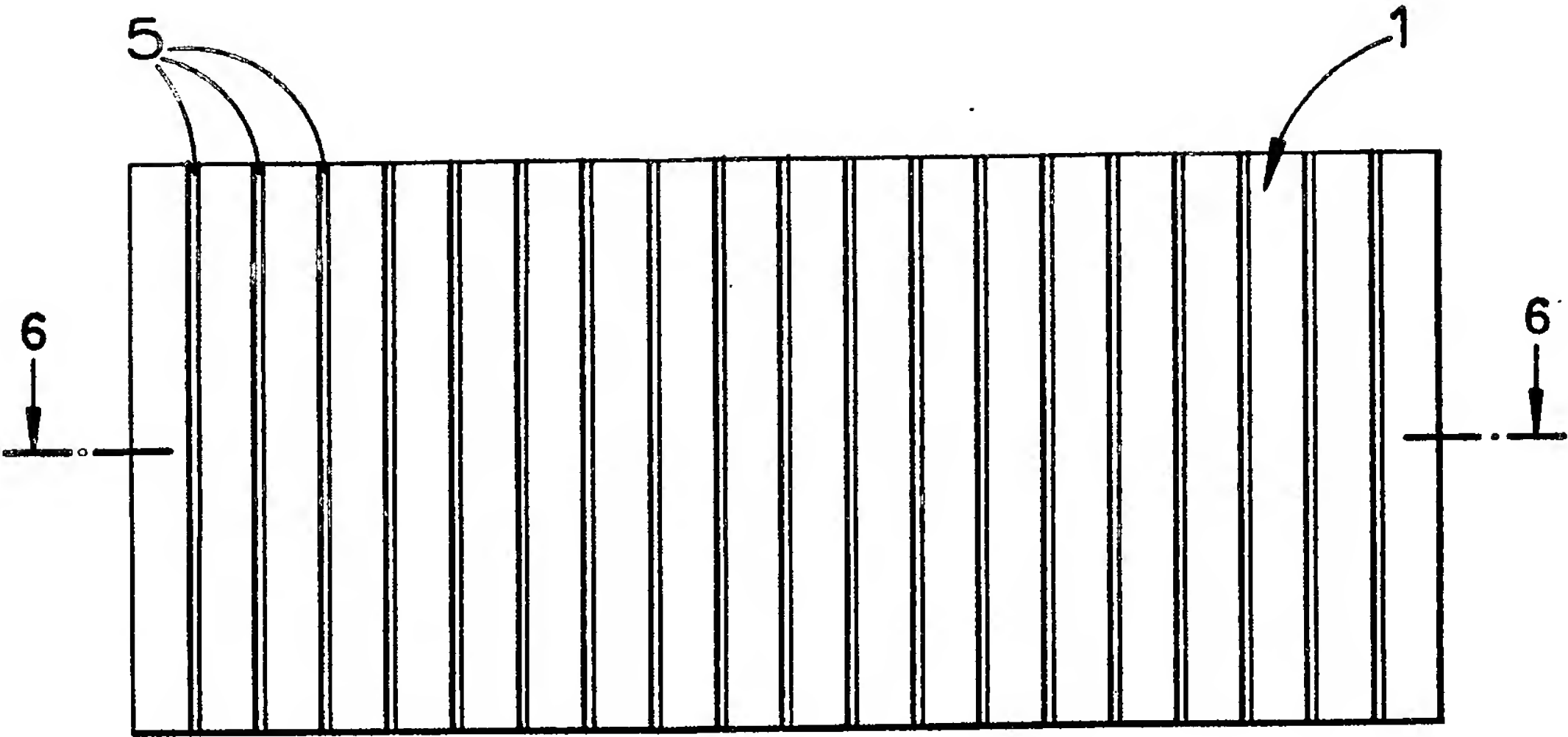


Fig. 5

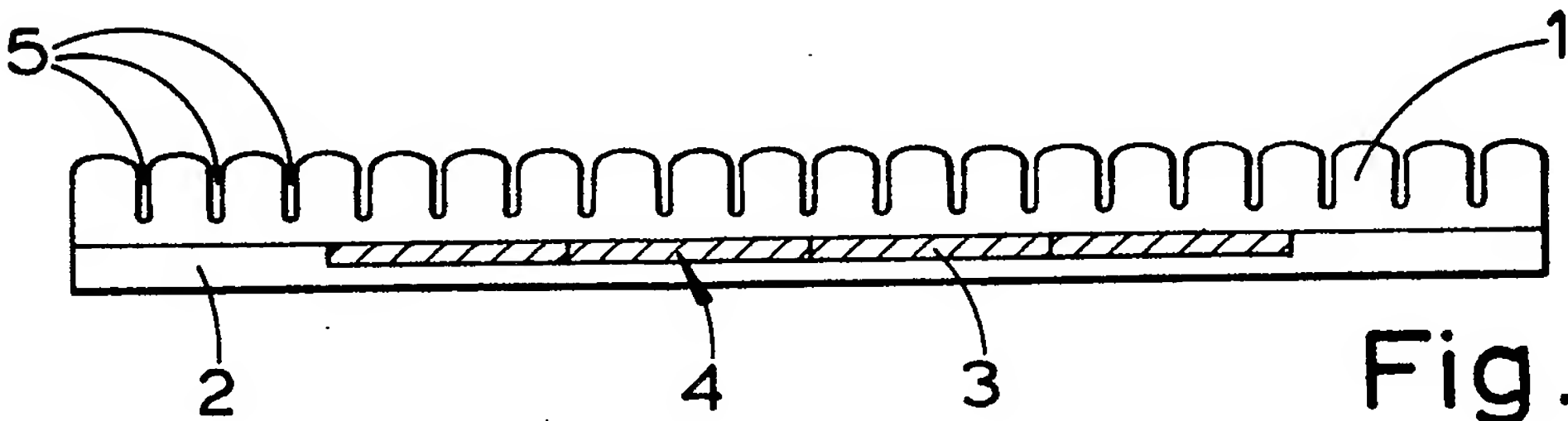


Fig. 6

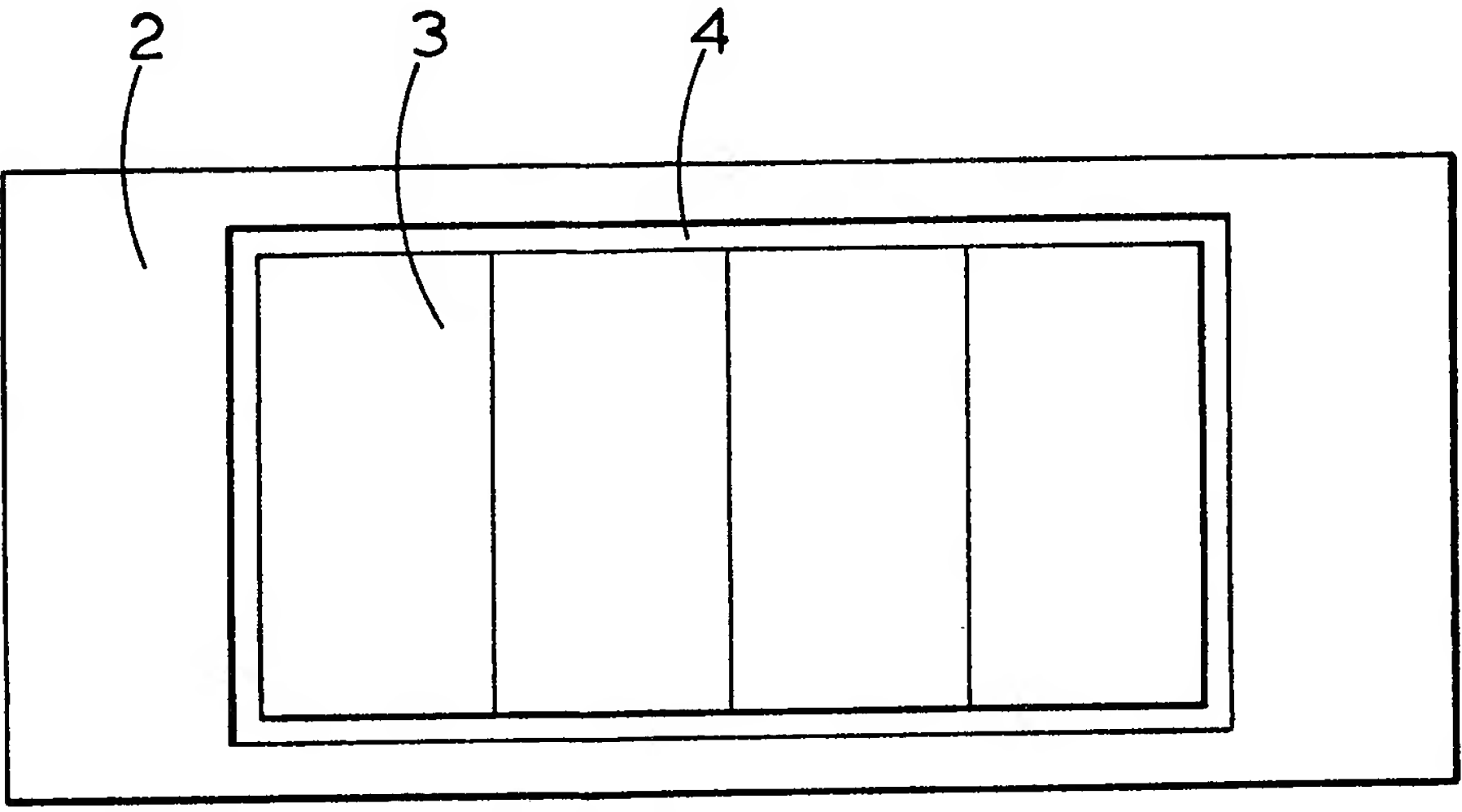


Fig. 7

SPECIFICATION

Pads, mattresses and similar articles

5 This invention relates to pads, cushions and mattresses, hereinafter all called, where the context so permits, pads. The pads of the present invention are particularly, but not exclusively, useful in supporting patients likely
10 to be subjected to the risk of bed sores. An object of the invention is to provide a pad by use of which the danger of a patient developing bed sores is much reduced.

Accordingly, the invention provides a pad,
15 cushion or mattress comprising two layers of a resilient material having between them a core consisting of a liquid-impervious envelope containing a liquid or gel, the layer on one side of the core, intended when the pad is in
20 use to be the base of the pad, being composed of material of a higher density than the material on the other side of the core.

When such a pad is in use, the core will be reshaped by the pressure of the body of the
25 patient on the pad thereby increasing the load bearing area of the pad. If the pad is to be used as a seat cushion the liquid contained in the core should be of higher viscosity than would be necessary if the pad is being used
30 as a mattress.

In one embodiment of the invention, the pad is composed of three sections arranged to form a substantially U-shape in plan. One of these sections, called a posterior section, is
35 intended to support the buttocks of a patient and the other two sections extend from the side of the posterior section and are intended to support the thighs of the patient. The thickness of the thigh-supporting sections increases towards the end remote from the
40 posterior section. A space is left between the two thigh-supporting sections to provide a free area for peroneal ventilation of the patient.

45 In another embodiment of the present invention, the base of the pad is rectangular and is provided with a well for receiving one or more fluid containing sacks constituting the core. The core is covered by a resilient top
50 layer which has a plurality of spaced apart transverse channels which open to the external surface of this layer. These channels allow the layer to change shape fairly freely with the fluid core and provide for instant re-shaping of
55 the fluid core and layer when pressure is applied to the top layer surface.

The invention is illustrated diagrammatically in the accompanying drawings in which:

60 *Figure 1* is a plan view of a pad constructed in accordance with a preferred embodiment of the invention,

Figure 2 is a section through a posterior section of the pad,

65 *Figure 3* is a section on the line 3-3 of Fig. 1,

Figure 4 is a section on the line 4-4 of Fig. 1,

70 *Figure 5* is a plan view of a pad constructed in accordance with another preferred embodiment of the present invention,

Figure 6 is a section on line 6-6 of Fig. 5, and

Figure 7 is a plan view of the embodiment of Fig. 5 with top layer removed.

75 The basic idea underlying the invention is illustrated in Fig. 2. As will be seen from that Figure, a pad according to the invention comprises two layers 1 and 2 of foam plastics or other resilient material. These two layers contain between them an elongate, spindle-shaped core 3 which consists of an envelope of liquid impervious material such as polyvinylchloride or polyethylene containing a liquid or a gel. The foam in the layer 2 which is
80 intended to be the base of the pad when it is in use is of higher density when it is in use is of higher density than the foam of the other layer 1 which is intended to be the upper layer when the device is in use.

90 As shown in Fig. 1 of the drawings, a pad is, in a preferred embodiment of the invention, composed of three sections arranged to form an article which is U-shaped in plan. Each of the three sections consist of the layers
95 1 and 2 of foam plastics material with a core 3 between them. The layers 1 and 2 are arranged completely to surround the core so that in an area surrounding the core they are joined together without having any of the
100 liquid core between them as clearly shown in Fig. 1. One of these sections, denoted P, is a posterior section intended to support the buttocks of a patient. The other two sections denoted T extend from the posterior section P
105 to give the whole pad its U-shaped appearance in plan. The sections T are intended to support the thighs of a patient and these sections are thicker at their distal ends so that they resist any downward force of the body of
110 the patient when the patient is in a semi-recumbent position.

The two layers of foam plastics material 1 and 2 can be secured together by an adhesive applied to the edge portions surrounding the
115 core.

The leg sections T are arranged with a space between them, the object of this space being to provide a free area for peroneal ventilation.

120 The various sections of the pad may be covered by a sheet of polyvinylchloride or a polyethylene-coated polyester in order to prevent the foam plastics layers becoming contaminated with urine or any discharge from
125 the patient.

A cushion of the kind described will reduce the interfaced pressure between the bony skeleton of a patient and the intervening tissue from about 320 mm Hg on a hard surface to
130 38 mm Hg in the upright sitting position.

Such an interface pressure is below the pressure which would be required to cut off the flow of blood through the capillaries of the patient, such flow varying with the length of time. For example, a pressure of 40 mm Hg would only partially cut off the blood flow for a period of 10 hours without abatement due to movement while a pressure of 100 mm Hg would cut off the flow in 2 hours.

10 The greater the length of the core, the thicker the core would have to be.

Fig. 5 to 7 show another embodiment of the present invention in which a base layer 2 and top layer 1 of foam plastics material completely enclose a fluid core 3 to form a mattress. In this embodiment, a well or recess 4 for receiving the fluid core 3 is provided in the base layer 2. The fluid core 3 consists of four liquid or gel containing sacks. These sacks are composed of a liquid impervious material such as polyvinylchloride or polyethylene and are contained in a further such liquid impervious sack or envelope.

The top layer 1 has a plurality of transverse channels 5 which extend from the top surface for, in this case 3/4 of the depth of the top layer.

In a preferred mattress construction, a rectangular block of high density foam having a rectangular central opening is heat welded to the surface of a second rectangular high density foam block to form base layer 2 with central well 4 as shown in Fig. 7. The surface of the second block to which the first is welded is covered by a layer of liquid impervious material such as polyvinylchloride. The side walls of the well 4 are similarly covered with a liquid impervious material so as to make the well liquid tight. The fluid core 3 which has a depth equal to that of the well 4 is then placed in the well and the top layer is heat welded to the portion of the base layer 2 surrounding the well 4.

Typical dimensions for the fluid core 3 of a 3ft by 6½ft (0.9 m by 2 m) mattress are approximately 2ft 4in by 4ft (0.7 m by 1.2 m) with a depth in the range of 2 in to 3 in (5 cm to 7.6 cm). An upper layer 1 for such a mattress is typically formed from a foam block 4 in (10.2 cm) thick having ½ in (1.3 cm) wide transverse channels cut to a depth of 3 in (7.6 cm) at 4 in (10.2 cm) intervals.

As previously mentioned, these channels 5 allow for the instant re-shaping of the top layer 1 and fluid core 3 when pressure is applied to the upper surface of the mattress. Thus, the mattress readily changes shape to accommodate the body contour of a patient lying on the mattress. This results in a spreading of pressure loading from high contour surfaces such as the buttocks, to provide an even pressure over the whole surface of the back. The interface pressure loading on the sacrum is thereby reduced to 20 to 24 mm Hg, which decreases the danger of restricting

the flow of blood to the sacrum.

CLAIMS

1. A pad comprising two layers of a resilient material having between them a core consisting of a liquid-impervious envelope containing a liquid or gel, the layer on one side of the core, intended, when the pad is in use, to be the base of the pad, being composed of material of a higher density than the material on the other side of the core.

2. A pad as claimed in claim 1 wherein the pad comprises three liquid or gel containing sections arranged, in plan, in a substantially U-shaped form, which sections respectively constitute a posterior section and two thigh supporting sections.

3. A pad as claimed in claim 3 wherein the thickness of the thigh supporting sections increases towards the distal ends thereof.

4. A pad as claimed in claim 2 or 3 wherein a space is provided between the two thigh supporting sections to provide for peroneal ventilation.

5. A pad as claimed in claim 1, wherein the layer constituting the base of the pad comprises a rectangular block of resilient material having a well herein containing one or more liquid or gel containing sacks constituting the core.

6. A pad as claimed in any preceding claims wherein the layer on said other side of the core has a plurality of spaced apart channels which extend transversely to the pad and open to the external surface of the layer.

7. A pad according to claim 6 wherein the channels extend from the external surface for ¾ of the thickness of said layer on said other side of the core.

8. A pad as claimed in any preceding claim wherein said liquid impervious material is selected from the group consisting of polyvinylchloride and polyethylene.

9. A pad as claimed in any preceding claim wherein said resilient material is a foam plastics material.

10. A pad as claimed in any preceding claim wherein the external surface of the layer on said other side of the core is provided with a liquid impervious layer.

11. A pad as claimed in claim 10 wherein said layer on said other side of the core is covered by a sheet of liquid impervious material selected from the group consisting of polyvinylchloride and polyethylene coated polyester.

12. A pad substantially as herein described with reference to Figs. 1 to 4 or 5 to 7 of the accompanying drawings.